ARUP

EIS

Project Echidna

Infrastructure Requirements Report

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Job number 288255-00

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Executive Summary

The subject site is located at 10 Eastern Creek Drive, Eastern Creek, NSW and sits within a wider industrial estate. The proposed Data Centre (DC) site development works will comprise a benched earthworks platform, building structures, roadworks, stormwater, and utility connections to the building.

The proposed “Project Echidna” Data Centre is a critical facility and therefore requires redundancy in its utility servicing, including back up electrical generation, water storage tanks and separated telecommunication conduit routes. It will be the second 2-storey DC building at the campus. The first DC (Building 1) at the campus is currently under construction. The construction of a dedicated tape library facility (Building 1A) is scheduled to commence soon. This will be followed by the construction of the electrical substation for which a D&C Contractor has just been appointed. Both substation and tape library are under separate Development Applications.

There is existing sewerage and stormwater infrastructure within the boundary of the proposed site. These services will be considered, and their operation maintained as part of the detailed design proposal for the site. No other public utilities will be located within the subject site boundary. Connections to public utilities will be made outside the subject site boundary. There is therefore minimal construction impact on existing publicly or privately owned utilities within the subject site.

In the permanent arrangement, power to Project Echidna will be provided via an onsite substation owned and constructed by the Proponent. It is understood the substation will be constructed and operational by the time the proposed DC build is completed.

Back up electrical supply to Project Echidna will be provided in the form of 18No. low voltage 2.8MW and 1No. 0.6MW standby LV generators to supply the data centre and associated office critical loads. Each generator will be housed in a prefabricated generator enclosure with noise attenuation and a belly tank, designed to comply with AS1940 and providing 24 hours fuel storage. A separate bulk fuel tank at the designated fuel offloading point will be used to fill generator belly tanks as required through a reticulated pipework system.

To meet the high-water demands associated with the cooling equipment, both harvested rainwater and mains supplies will be used. Water and rainwater harvesting tanks will be installed to store water. Water and sewer connections will be provided from mains infrastructure within the estate. The proposed water main requires to be upsized to cater for the demands of the data centre.

As this facility will be the second DC building at the campus, no new telecommunication entry points are proposed for the site. Rather, the facility will connect into the existing sitewide private pit and pipe telco network.

Glossary of Abbreviations

Abbreviations	
ASP3	Accredited Service Provide Level 3
DC	Data Centre facility in which a business can operate or rent space for servers and other computing hardware.
kL	Kilo-litre (1000l – equivalent to 1m3 volume)
MVA	Mega Volt Amp
MW	Megawatts
POEO	Protection of the Environment Operations Act
Proposal (the)	The purpose of the proposal is
SEARs	Secretary's Environmental Assessment Requirements
UGOH	Underground to Overhead
WSC	Water Services Co-ordinator
WWTP	Wastewater Treatment Plant
D&C	Design and Construct

1. Introduction

1.1 Proposal Components and Key Terms

1.1.1 Key Terminology and Project Details

Table 1: Terminology and Project Details

Term	Definition
Proposal	Construction of a two-storey data centre comprising of data halls, mechanical and electrical equipment rooms, offices, other ancillary support spaces, and external/rooftop mechanical and electrical equipment.
Proposal area	The building has a total area of approximately 9,000 square metres comprising two data floors (Ground Floor + Level 1).
Site	The proposal is located at 10 Eastern Creek Drive, Eastern Creek NSW, legally described as Lot 4001, DP 1243178. The site is situated within the Blacktown Local Government Area.
Concept Design Approval	A previous DA (SPP-19-00013) was approved on site for the industrial development of a Detailed Design Stage 1 and a Concept Design Approval of an outline for Stage 2, which is the subject of this Proposal.
State Significant Development (SSD) Trigger	The data centre building will have a capacity of over 10MW, which triggers the proposal as a State Significant Development under the Schedule 1 of the State Environmental Planning Policy (Planning Systems) 2021.

1.1.2 Proposal Overview

Arup is seeking development consent to construct a data centre (the Proposal) at 10 Eastern Creek Drive, Eastern Creek NSW, legally described as Lot 4001 DP 1243178 (the Site). The Proposal involves the construction of a two-storey data centre comprising of data halls, mechanical and electrical equipment rooms, offices, other ancillary support spaces, and external/rooftop mechanical and electrical equipment. The Site is situated within the Blacktown Local Government Area (LGA) on the corner of Eastern Creek Drive and Old Wallgrove Road.

The parcel of land is currently vacant, and the site gross floor area (GFA) is of approximately 9,000 square metres.

The design of the Data Centre is based on the end-client's reference design as well as applicable Australian Standards and will deliver capacity for approximately 35.2MW of IT equipment. Utility power will be delivered via a dedicated on-site electricity substation (subject to a separate development application), with emergency backup power provided by a combination of lithium-ion battery systems and standby generators. Cooling will be delivered by highly efficient fresh air free-cooling systems to ensure energy consumption is minimised as far as practical.

The two (2) level facility will reach a building height of approximately 25m including all significant plant and rooftop equipment. The facility will include two (2) levels of data hall space and supporting plantrooms, and supporting administrative spaces incorporating secure entry facilities, loading dock, storage, staff offices and the like. The standby generators will occupy an external equipment yard to the west of the main building, and some mechanical equipment will be located at roof level. The site will be served from a private on-site substation, located to the west of the proposed data centre building and subject to a separate development application.

Landscaped areas are also proposed, where mature local trees will be used to improve aesthetics and amenity for local businesses.

On-site car parking spaces will be provided for staff and visitors, including disabled and electric vehicle parking.

Figure 1 shows the Site and surrounding context. Figure 2 shows an overview of the site

1.1.3 Permissibility and Approval Pathway

Division 4.7 of Part 4 of the EP&A Act covers State significant development (SSD). The Proposal is identified as SSD by virtue of meeting thresholds defined under Schedule 1, Clause 25 of the *State Environmental Planning Policy (Planning Systems) 2021*. Specifically, the Proposal is appropriately classified as a data storage development with a capacity of more than 10 megawatts (see Chapter 4 (Strategic context) for further detail).

The proposed data centre is permissible with consent within a light industrial zone pursuant to the provisions outlined in Section 2.31 of State Environmental Planning Policy (Transport and Infrastructure) 2021.

Given the proposal has a capacity that is greater than 10 MW, the proposal classifies as State Significant Development (SSD) pursuant to the provisions outlined in Schedule 1 of the *State Environmental Planning Policy (Planning Systems) 2021*.

1.1.4 Development History

The previous planning approvals relevant to the subject SSDA and proposed development include:

- **DA-18-00196:** Consent was granted for the *'Torrens Title subdivision of 1 lot into 1 industrial lot and 1 residue lot'* of Lot 532, DP 1236811 which created the subject lot.
- **DA-18-00938:** On 6 December 2018 consent was granted for 'Bulk earthworks entailing cut and fill across the site to facilitate suitable site levels for future built form (subject to future approval)'. The associated Construction Certificate is CC-19-00320. These earthworks have been completed on site. The subject development proposed has been designed to respond to these works.
- **DA-18-01592:** On 20 June 2019 consent was granted for the construction of a warehouse and distribution facility comprising 33,250 square metres of GFA, 266 vehicles and site landscaping. Construction of this project has not commenced at this time.
- **DA-20-10387:** On 15 September 2020 consent was granted for the installation of 4 temporary electricity kiosks for interim power supply for an approved data centre.
- **SPP-19-00013:** A previous DA was approved on site for the industrial development of a Detailed Design Stage 1 and a Concept Design Approval of an outline for Stage 2, which is the subject of this Proposal. It is intended that this SSDA will supersede the existing Concept Design Approval for Stage 2.

1.1.5 Proposal Need and Benefits

The proposed development, construction and operational use of the Data Centre will serve Sydney and the wider region in providing for increasing cloud-based storage and compute requirements. The Data Centre will positively impact the social and economic conditions of Eastern Creek and the Blacktown City Council LGA, creating jobs during both construction and operation.

Arup and the Client are committed to delivering a high-quality development with economic and employment benefits for the Eastern Creek District and the residents and visitors of the region through effective collaboration with key stakeholders, including State government agencies and Blacktown City Council.

Image Source: SIX MAP

Figure 1 Site Context

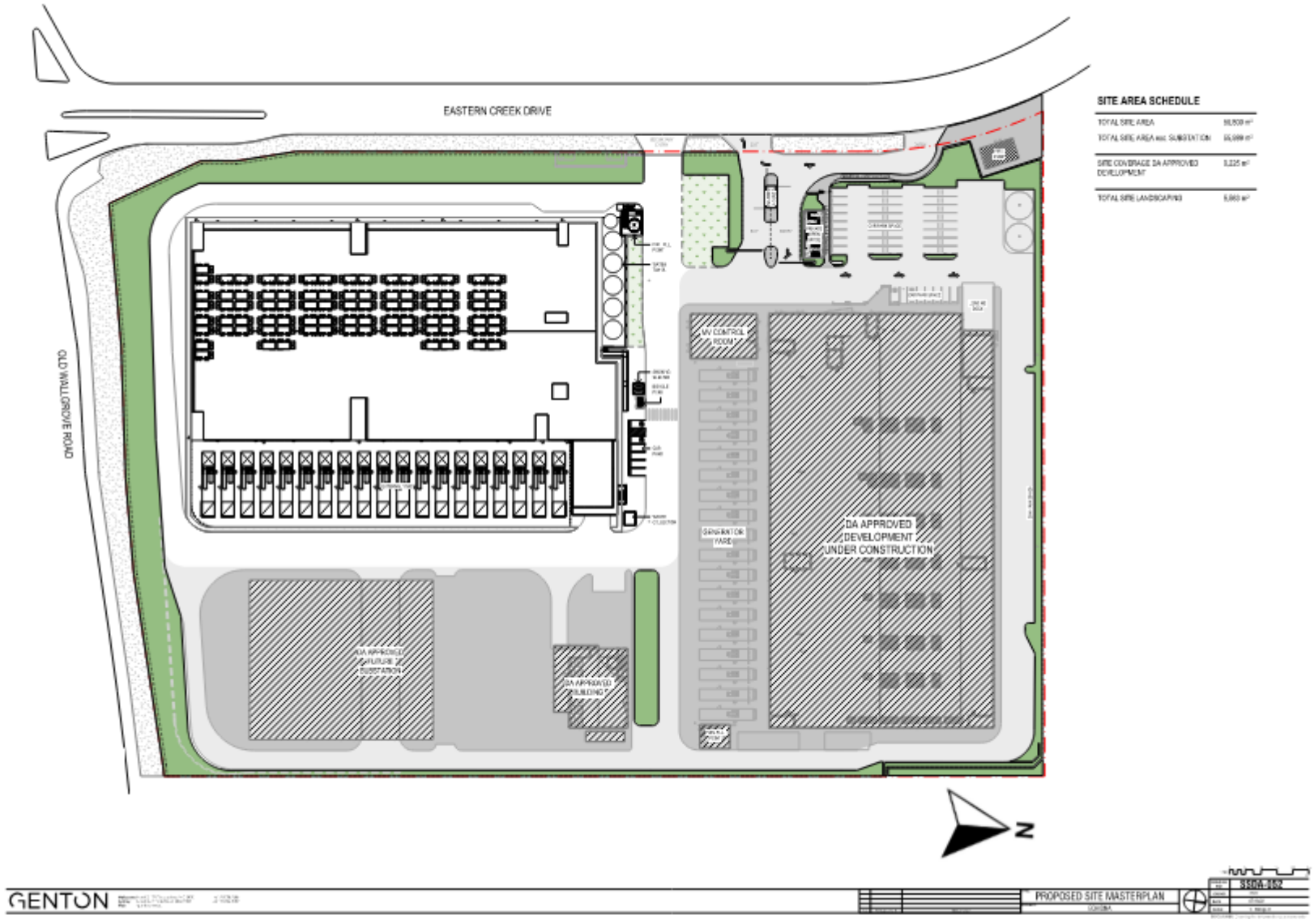

Figure 2 Site Figure

1.2 SEARs and DCP Requirements Relevant to this Report

Table 2 identifies the SEARs and DCP requirements which are relevant to this technical assessment

Table 2: SEARs and DCP requirements for Services and Infrastructure

SEARs relevant to this technical report	Where addressed in this technical report
Infrastructure Requirements and Utilities **In consultation with relevant service providers:**	Section 5
Identify any infrastructure upgrades required on-site and off-site to facilitate the development and any arrangements to ensure that the upgrades will be implemented on time and be maintained.	Sections 5.1 to 5.4
Assess the impacts of the development on existing utility infrastructure and service provider assets surrounding the site.	Section 5.1
Provide an infrastructure delivery and staging plan, including a description of how infrastructure requirements would be co-ordinated, funded and delivered to facilitate the development.	Section 6 and 7
Agency comments	
EPA – Electricity Generation **The EPA requests further information be provided on the back-up generators, including:** **Number of back-up generators proposed** **Individual capacity (in terms of megawatts and megajoules per second)** **Maximum operating time in an emergency situation** **Testing procedure, frequency and duration** **Confirmation that testing will be carried out individually or in clusters; and** **Justification of the need to test during the evening or at night**	Section 5.1
EPA – Electricity Generation **The Environmental Impact Statement (EIS) should definitely state whether schedules testing will exceed that 200-hour annual limit. If the testing time is definitely stated to be less than 200 hours per annum, then DPIE may want to consider adding a condition of consent reflecting this. Alternatively, if testing time could exceed 200 hours per year, then the proposed activity may meet the trigger for Clause 17, schedule 1 of the POEO Act. Please note that the EPA would consider 'operating' to include testing, if testing involved starting the generator. In addition, the definition of 'plant' in the schedule activity includes all generators on the premises, not each individual generator.**	Section 5.1
EPA – Chemical Storage **The EPA requests clarification on the total volume of diesel proposed to be stored at the premises and the capacity of the tanks in which diesel is to be stored. Under Clause 9 of the POEO Act, an activity requires a license is there is a capacity to store more than 2,000 tonnes of petroleum products (which includes diesel).** **Information on the location and design of chemical bunding and containments should also be included in the EIS. If diesel storage tanks are above ground, bunding requirements are set out in AS 1940:2017 The storage and handling of flammable and combustible liquids.**	Section 5.1
Sydney Water – Water-related Infrastructure Requirements **The proponent of the development should determine service demands following servicing investigations and demonstrate that satisfactory arrangements for drinking water, wastewater, and recycled water (if required) services have been made.**	Sections 5.2 and 5.3

Sydney Water – Water-related Infrastructure Requirements **The proponent must obtain endorsement and/or approval from Sydney Water to ensure that the proposed development does not adversely impact on any existing water, wastewater or stormwater main, or any other Sydney Water asset, including easement or property. When determining landscaping options, the proponent should take into account that certain tree species can cause cracking or blockage of Sydney water pipes and therefore should be avoided.**	Sections 5.2 and 5.3
Sydney Water – Water-related Infrastructure Requirements **Strict requirements for Sydney Water's stormwater assets (for certain types of development) may apply to this site. The proponent should ensure that satisfactory steps/measures been taken to protect existing stormwater assets such as avoiding building over and/or adjacent to stormwater assets and building bridges over stormwater assets. The proponent should consider taking measures to minimise or eliminate potential flooding, degradation of water quality, and avoid adverse impacts on any heritage items, and create pipeline easements where required.**	Section 6.3
Sydney Water – Integrated Water Cycle Management **The proponent should outline any sustainability initiative that will minimise/reduce the demand for drinking water, including any alternative water supply and end uses of drinking and non-drinking water that may be proposed, and demonstrate water sensitive urban design (principles are used), and any water conservation measures that are likely to be proposed. This will allow Sydney Water to determine the impact of the development on our existing services and required system capacity to service the development.**	Section 5.2

2. Policy and Planning Context

This Section presents relevant regulation, legislation, and policy governing management of public utilities as it relates to the proposal.

2.1 Legislative Context

2.1.1 Commonwealth Legislation

Relevant Commonwealth legislative requirements to protect public utilities are noted below:

- Telecommunications Act 1997
- Security of Critical Infrastructure Act 2018

2.1.2 New South Wales Legislation

Relevant NSW legislative requirements to protect public utilities are noted below:

- Protection of the Environment Operations Act 1997
- State Environmental Planning Policy (Infrastructure) 2007
- Electricity Supply Act 1995
- Gas Supply Act 1996
- Water Management Act 2000

2.1.3 Guidelines

Relevant guidelines are outlined below:

- Fire safety guideline, Access for fire brigade vehicles and firefighters, ver 05.01, November 2020, Fire and Rescue NSW (FRNSW).
- AS 5601 Gas installations
- AS/NZS 4645 Gas distribution networks
- Jemena Network Operator Rules
- Jemena Guidelines – Construction activities near and over Jemena gas network assets
- Building over and adjacent to pipe assets, 2015, Sydney Water
- WSA 02-2002-2.2 Sewerage Code of Australia (Sydney Water Edition)
- WSA 03-2011-3.1 Water Supply Code of Australia (Sydney Water Edition)
- Telstra's lead-in trenching requirements

3. Methodology

This Section outlines the methodology used to define the baseline and undertake the environmental assessment of potential impacts of the proposal on public utilities including definition of the study area used as the basis of the assessment.

3.1 Study Area

The assessment area will be limited to the subject site (the site boundary) and existing utilities along the southern and western boundaries of the subject site.

The assessment also considers the detailed design documentation for Stage 1 and 1A and the electrical substation design.

3.2 Method of Assessment

To address the project SEARs and address points raised by public utility authorities the following methodology was developed:

- Collate and review available data on existing public utilities, including conducting a Before You Dig Australia (BYDA) search.
- Assess proposed site layout against any existing public utility infrastructure within the proposal boundary and identify any necessary protection or diversion works required.

It is noted the proposed new 132kV site substation is being assessed under a separate DA. Arup have coordinated with the substation designers to ensure the below points have been considered:

- Undertake demand assessment for each core utility serving the data centre.
- Consult with all relevant service providers to determine necessary off-site utility upgrades.
- Define preferred point of connection or servicing strategy for the development for each service.
- Develop a site plan considering key, on-site utility infrastructure required to serve the data centre.

4. Existing environment

This Section describes the existing utilities infrastructure network at the proposed development site.

Access to the estate and ultimately the development site can be made via the Old Wallgrove Road and Eastern Creek Drive intersection as shown in Figure 3.

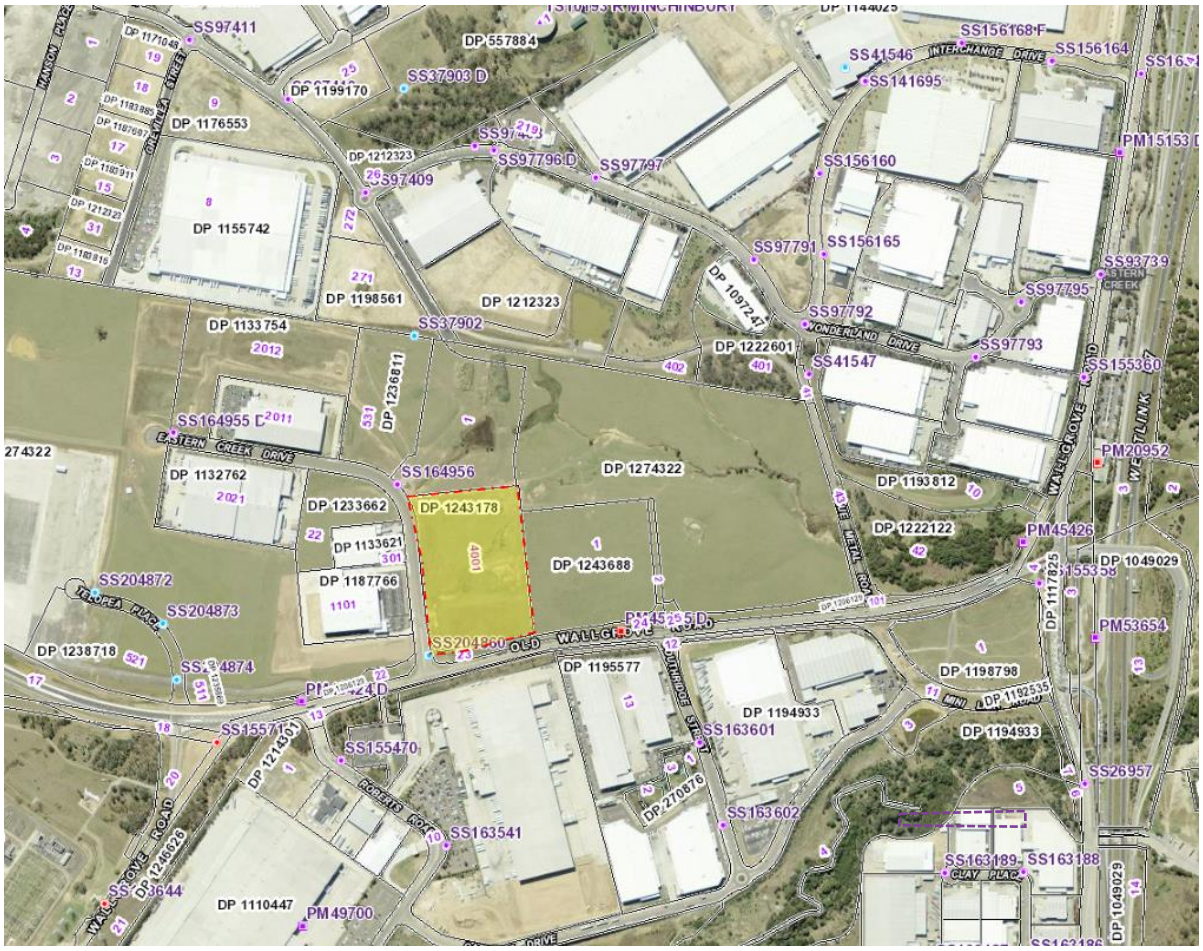

Figure 3 Overall Site Boundary Extents

Table 3: Site Definitions

Site	Definition within this report	State of the land within the site boundary
Existing	Pre-Consented Development	Greenfield/Undeveloped
Baseline	Post-Consented Development	Graded earthworks platform with temporary erosion and sediment control measures in place.

The post-consented development design accounts for the various future developments proposed within the estate site boundary, including the proposed data centre. The baseline site will feature:

- Connection stubs/points to the wider estate utility networks;
- Graded earthworks platform with raised site levels which provides flood immunity;
- Sediment and erosion control measures to suit the graded platform;

- Access roads bounding the southern and western baseline site boundary providing access to the proposed site.

Existing utility provisions from BYDA searches and the consented estate design are described in sections 4.1 to 4.8.

The following utility providers have been identified as known to have assets located in broader proximity to the estate area:

Table 4: Schedule of Utility Providers with assets in the near proximity of the estate

Utility Provider	Utility Type
Endeavour Energy	Electricity
Fibreconx	Communications
NBN Co	Communications
Sydney Water	Water supply and Sewerage
Telstra	Communications
TPG	Communications
Optus and Uecomm	Communications
Vocus	Communications

4.1 Electrical Services

Existing underground electrical ducts run along Old Wallgrove Road and Eastern Creek Drive based on BYDA information from Endeavour Energy (Refer to Figure 4, below).

As part of Building 1 site construction, 4No. Endeavour Energy 11kV switching stations were installed on the site boundary adjacent to Eastern Creek Drive for temporary 11kV site feeder connections. From the switching stations, a private conduit network serves Building 1 within the site.

No other existing Endeavour Energy utility assets are present within the site.

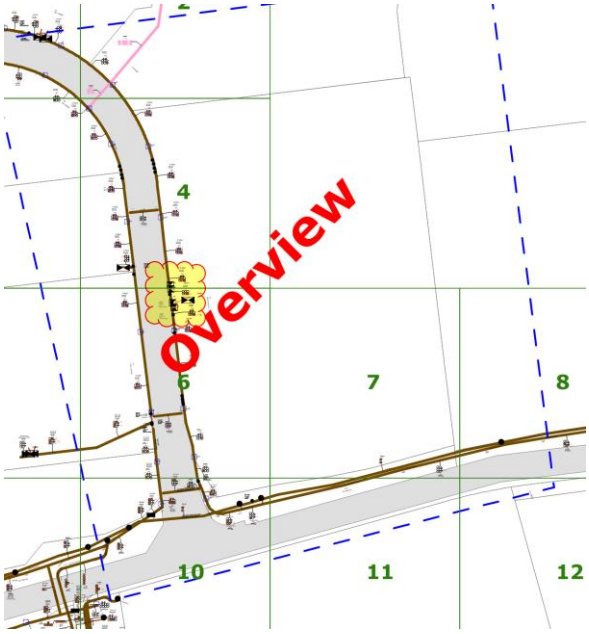

Figure 4 Endeavour Energy BYDA Overview Plan (11kV Switching Stations Highlighted)

4.2 Water Services

There are existing water services within the subject site boundary that have been provided during stage 1 with the construction of Building 1.

The site is currently provided with 4 separate water connections to the authorities water main at Eastern Creek Drive and 1 new water connection required for fire hydrant services to Project Echidna as follows;

- 1 x 200mm fire sprinkler connection
- 1 x 200mm fire hydrant connection
- 2 x 150mm domestic cold water connections
- 1 (new) x 150mm fire hydrant service Project Echidna only

An estate water supply main will be located within the estate access road carriageways, and potable water main and fire services connections for the proposed project are to connect to services provided as part of the Building 1 project refer to **Error! Reference source not found.** below. Sydney Water owned existing 200mm uPVC water main runs under Eastern Creek Drive eastern footway, and a 450mm DICL water main runs under Eastern Creek Drive western footway. An existing 300mm uPVC water main runs along the southern side of Old Wallgrove Road.

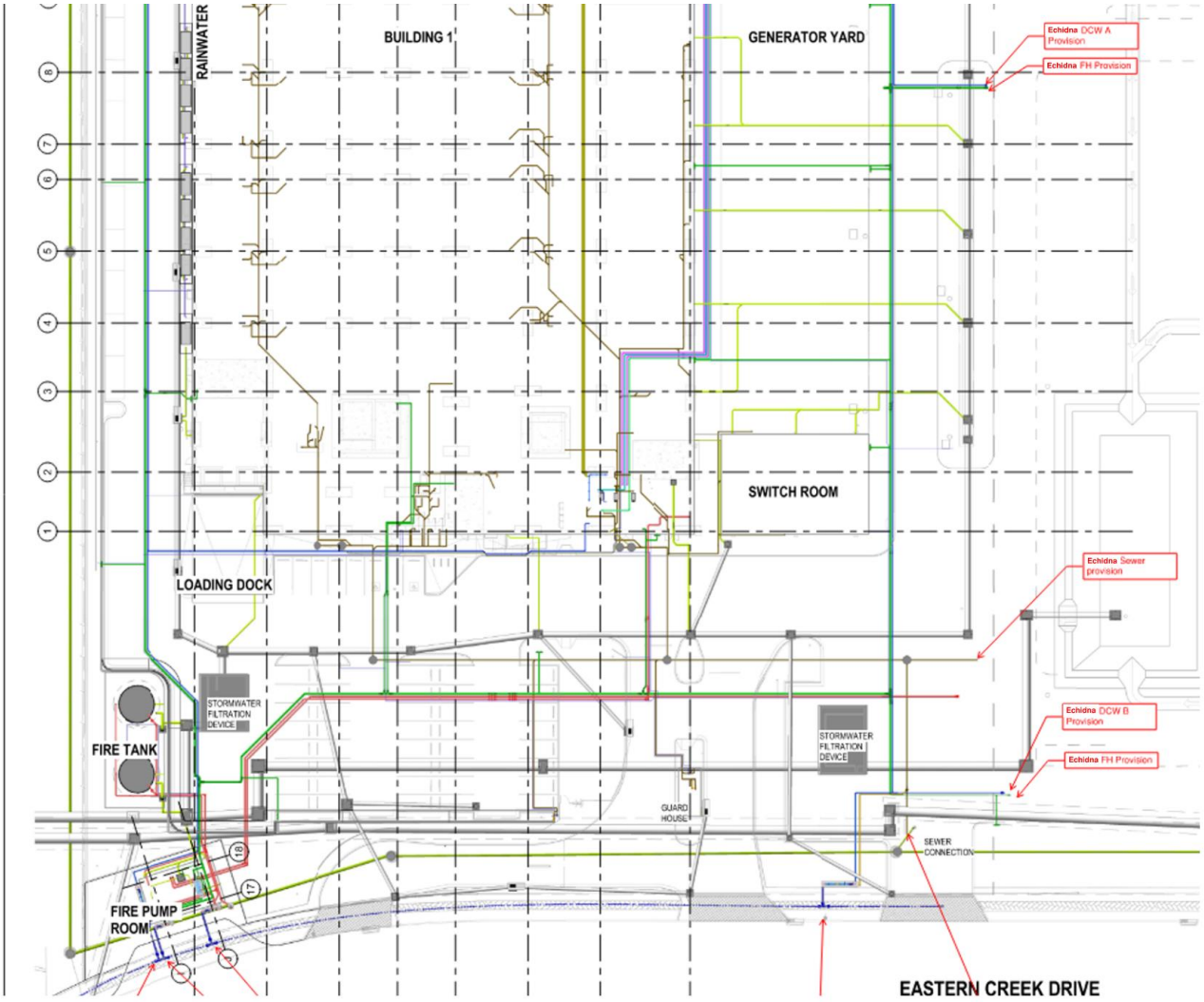

Figure 5 Baseline Water Services

4.3 Sewer Services

There is an existing 300mm GRP Sydney Water owned sewer line within the subject site boundary. The sewer runs in a north-south direction along the subject site western boundary.

The sewer connection point location is shown in **Error! Reference source not found.** below. As per discussions with the proponent, this may be subject to change pending later design stages to suit the final design.

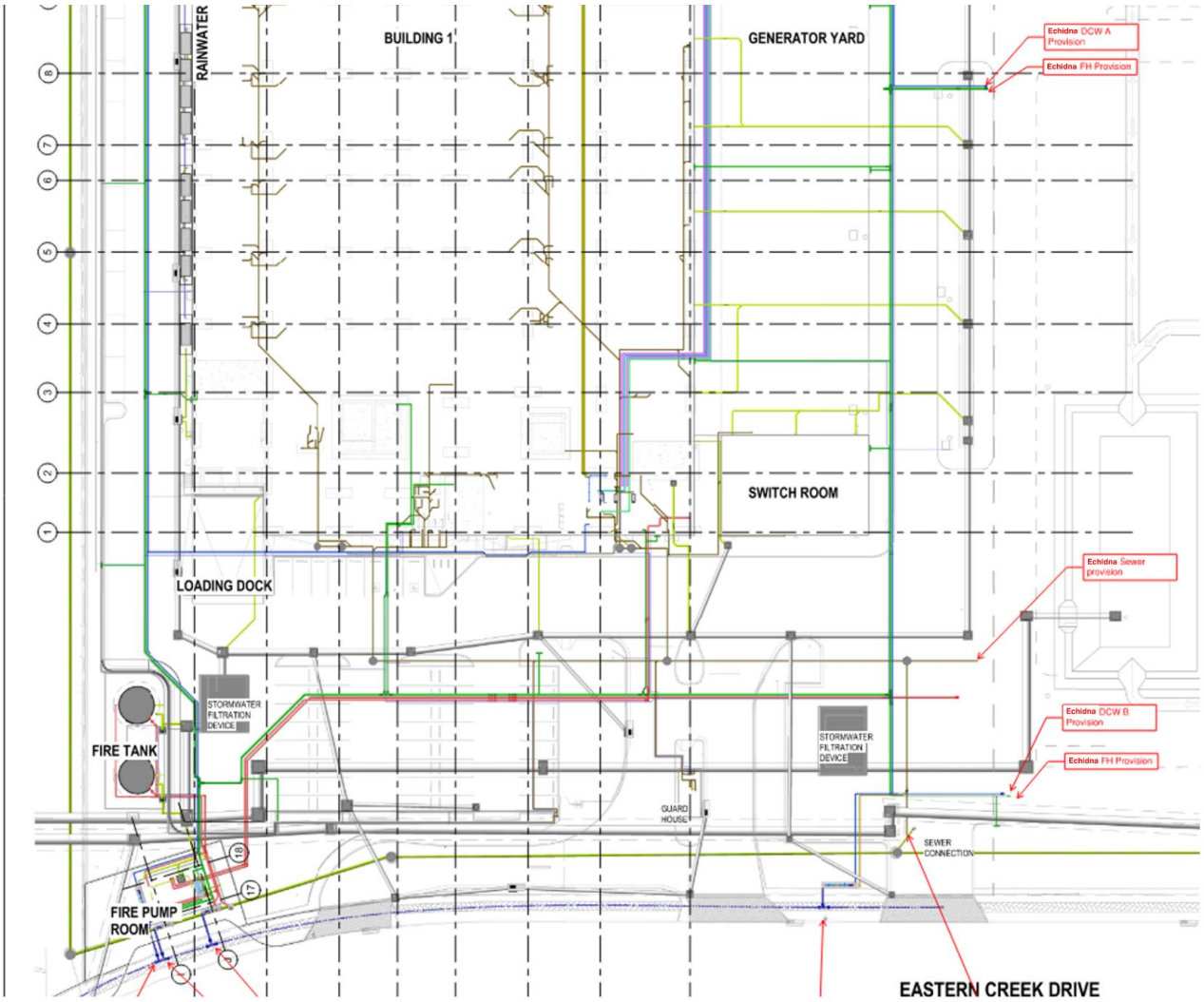

Figure 6 Sewer Connections Plan

4.4 Communications Services

There are no existing utility owned telecommunication services within the subject site boundary. Telstra, NBN Co, Optus, Uecomm, FibreconX, TPG and Vocus networks border the estate site along Old Wallgrove Road and Eastern Creek Drive as identified from the BYDA search.

An extensive private telecommunications pit and conduit network exists within the site serving the existing Building 1. This connects back in 3No. locations to Old Wallgrove Road and 1No. location to Eastern Creek Drive.

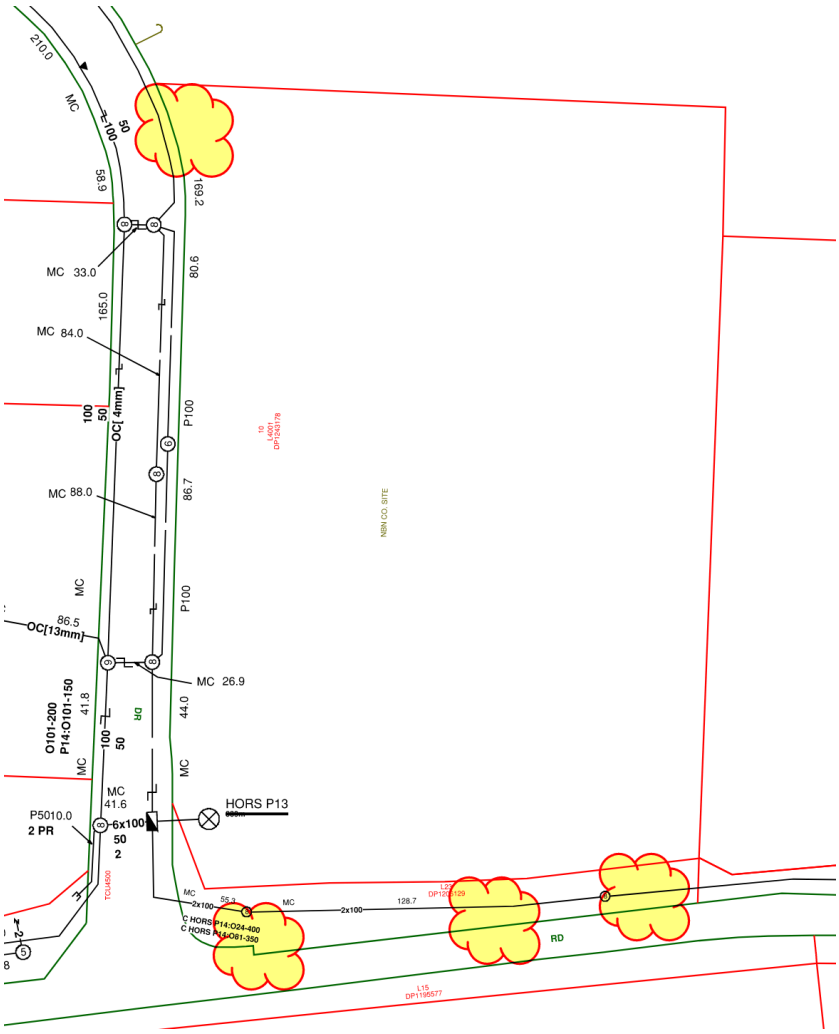

Figure 7 Telstra BYDA Plan (Telco Site Connection Points Highlighted)

4.5 Gas Services

There are no existing gas services within the subject site boundary or in the near vicinity to the site.

4.6 Existing Stormwater Assets

Details on existing stormwater assets, proposed stormwater infrastructure, water quality, water balance, and environmental measures, are discussed and can be found within the Stormwater and Flooding report.

4.7 Traffic Signals

Old Wallgrove Road and Eastern Creek Drive intersection is a signalised intersection. Traffic signals infrastructure may be present outside the south-western corner of the subject site,

No traffic signals have been identified as located within the subject site.

5. Servicing Strategies

This Section describes the service demands and details the proposed servicing strategies for the development.

Data centres are required to maintain a controlled temperature environment to safely operate the high density of equipment contained within the data halls. The outcome of this is a significant electrical and water demand which varies throughout the year depending on the ambient temperature. A large number of telecommunication conduits are also required to support a data centre.

When developing estate utility designs, demands were based on light industrial use. Given the higher electrical, water, sewer and telecommunications demands to serve the data centre, additional utility supplies are required. These higher demands are met by either augmenting proposed estate utility provision or by separate utility supplies. Further details are discussed in Sections 5.1 to 5.5.

Key on-site utility infrastructure required to serve Project Echidna include:

- HV substation & control room
- Back-up electrical generators
- Potable and industrial water tanks

It is noted that the site substation is currently being considered under a separate DA. As such, Arup have consulted with the substation designers to ensure impacts from this proposed development on existing utility infrastructure and service provider assets surrounding the development have been considered within the substation design.

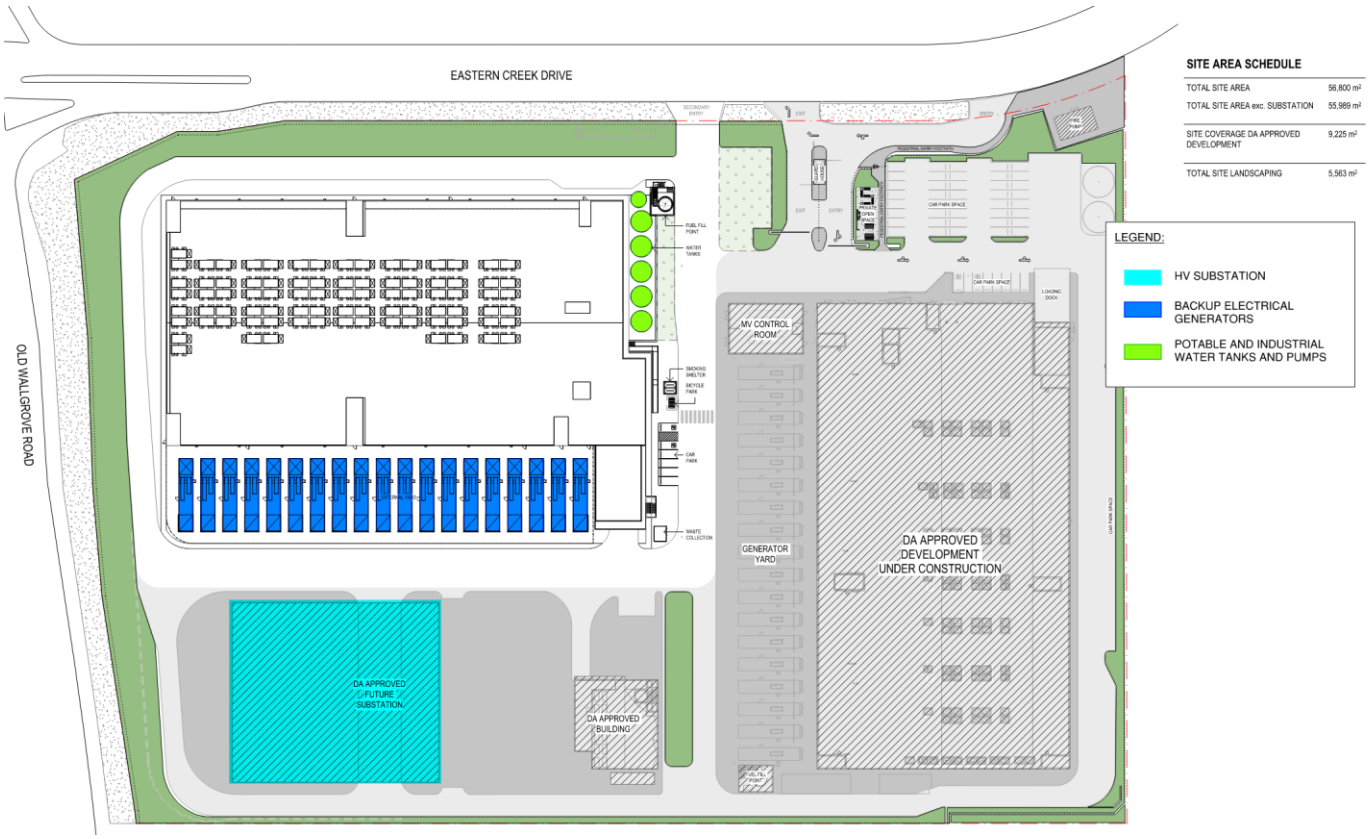

Figure 8 On-site Utility Infrastructure

To suit demand, construction of Project Echidna will be phased. The exact ramping programme is to be confirmed but anticipated to be in the order of 18 months. With the number of data halls increasing over this time period, the increase in utility demand will follow a similar ramping profile.

The assessment and information presented in the following sections reflect the final arrangement however information is presented on key intermediate steps. Table 5 presents a high-level construction staging of the data centre.

Table 5: Construction Staging of Project Echidna

Stage	Built Form	Key Utility Provision
Stage 1 – Initial Construction	Data Centre Shell Fit out of initial data halls and admin space	Connection to site 132kV substation (under separate DA) Water and sewer connections to lot networks. Telecom connections to existing internal campus private telco network Fire water, potable water and rainwater harvesting tanks to serve site. External generators to suit fit out staging.
Stage 2 – Within 18 months	Fit out of remaining data halls	External generators to suit fit out staging.

5.1 Electrical Infrastructure and Back-Up Generators

Project Echidna is to be supplied by a new 132kV privately owned substation (being progressed under a separate DA) to cater for the ultimate site load. This substation will also supply the existing Building 1 and future Building 1A on the site, after which the temporary Endeavour Energy 11kV feeders will be removed.

The data centre is a mission critical facility and therefore requires back up generation. Project Echidna is designed for a total of 18No. low voltage 2.8MW standby LV generators to supply the data centre critical loads and 1No. low voltage 600kW standby LV generator to supply the admin area. All generators will be housed in a prefabricated, acoustic rated, generator enclosures with belly tanks to store diesel fuel. All generator enclosures will be free-standing on the external handstand.

Location of the LV generators and 132kV substation are depicted in Figure 9**Error! Reference source not found.**, shaded dark and light blue respectively.

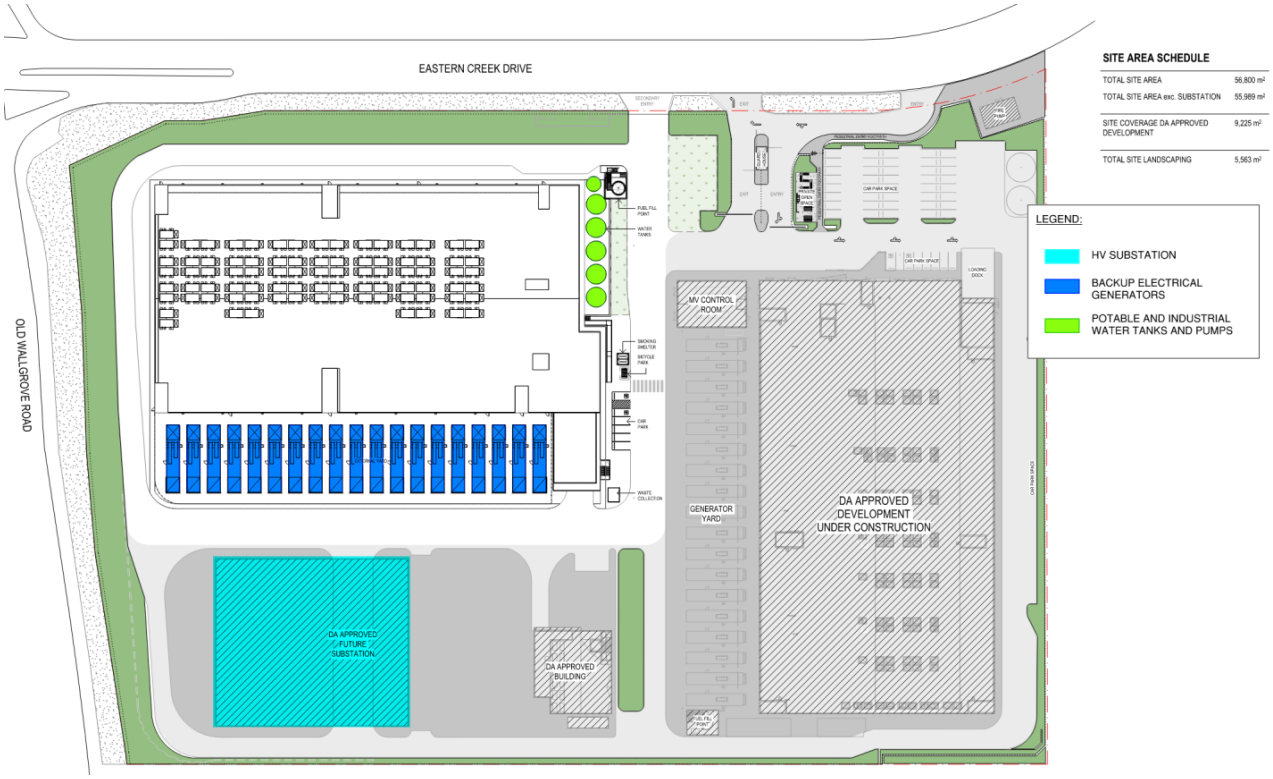

Figure 9 132kV Substation and Generator Location

5.1.1 Demand Estimate

The maximum demand is indicated in Table 6 below. The calculated demand for the proposed data centre at concept design is approximately 44.46MVA.

Table 6: Development Electrical Maximum Demand

Site Electrical Load Summary Result		
	Total Load	Unit
IT Load	35.2	MW
Total Load	42.24	MW
Calculated PUE	1.2	
Power Factor	0.95	
Total kVA	44.46	MVA

The 132kV site substation will supply the development and is a prerequisite for energisation. No temporary utility feeders will be utilised.

5.1.2 On site Electrical Infrastructure

The electrical infrastructure for the proposed data centre campus (incorporating Building 1, 1A and Project Echidna) includes:

- A new 132kV/11kV substation station to cater for the overall consolidated site load, located at the southeast corner of the site. This substation is currently under a separate in-progress DA.

- Existing temporary 11kV Endeavour Energy switching stations at the site boundary to serve as a point of connection for the temporary supply to existing Building 1. These switching stations will be removed following transfer of Building 1 to the new site substation.

The infrastructure in the new substation will be owned by the Proponent and includes:

- 132kV switchgear for control of the incoming 132kV feeders, and protection and distribution to the 45MVA transformers
- 3 no. 40/45MVA ONAN/ONAF 132/11kV transformers.
- 11kV switchgear to allow for protection, control, and distribution of power around the site via a 11kV Proponent owned network
- 2 no. 11/0.415kV Station services step down transformers to supply the electrical demands of the substation
- Additional miscellaneous equipment relating to SCADA, protection, control, and operation of the substation.

Site 11kV reticulation will be by means of underground cabling.

5.1.3 Consultation

It is understood the substation proponent has engaged with the relevant stakeholders including Endeavour Energy under a separate Development Application, and that an Offer of Connection has been provided and accepted by the Proponent. Arup have liaised with the substation designers to ensure the electrical maximum demand from this development has been considered as part of the substation design and any required upstream utility augmentation works, noting high voltage electrical works under this proposal will be limited to connecting to the new site substation.

5.1.4 Connection Strategies

Both the existing interim 11kV supply and permanent 132kV supply routes are outside the subject site boundary and will be approved under the utility authority's own permitted development rights. This is being undertaken and coordinated under a separate Development Application.

5.1.5 Backup Generation

Project Echidna is a mission critical facility and therefore requires back up generation. The site is designed for a total of 18 no. low voltage 2.8MW standby LV diesel generators to supply the data centre critical loads. The admin / office component of the development will be provided with a dedicated low voltage 600kW emergency backup generator.

A summary of the total campus standby generation is provided below in **Error! Reference source not found.**.

Table 7: Site Standby Generation Capacity

	Data Hall Generator(s) (Qty / Power)	Admin Generator(s) (Qty / Power)
Building 1	18 @ 2.4MW	1 @ 0.8MW
Building 1A	1 @ 1.12MW	N/A
Project Echidna	18 @ 2.8MW	1 @ 0.6MW

Generators will operate as a standby power supply in the event of mains failure. It is understood the connection offer received from Endeavour Energy is for two redundant, fully rated supplies of the entire site load at 132kV. The probability of mains failure for the electrical supply in this arrangement on the Endeavour Energy 132kV network are extremely low.

Each Project Echidna generator will be housed in a prefabricated generator enclosure with a belly tank providing 24 hours diesel fuel storage. Fuel tanks will be designed to comply with AS1940. Preliminary fuel calculations are shown in Table 8 below.

A separate bulk 40kL single skin diesel tank with bunding compliant to AS1940 will be provided at a fuel tanker offloading point, with reticulated fuel pipework running to each generator belly tank for filling.

All Building 1 and 1A generators have been designed to comply with AS1940 and follow an identical generator arrangement incorporating prefabricated enclosures with belly tanks providing 24 hour storage. Building 1 incorporates a 40kL bulk offloading tank similar to Project Echidna.

Table 8: Diesel Fuel Calculations (Project Echidna)

	Data Hall Generator	Admin Generator	
Generator Rating	2.8	0.6	MW
Fuel Consumption	756 (Full Load)	208 (Full Load)	L/hr
Storage time	24	24	hr
Fuel Stored	18.2	5.5	kL
No. Generators (#)	18	1	
Bulk Offloading Tank Capacity	40		kL
Project Echidna Fuel Consumption	13.8 (Full Load)		kL/hr
Project Echidna Total Fuel (volume)	386.6		kL
Project Echidna Total Fuel (weight)	342.2		t

A summary of the total diesel fuel storage on campus is given below in **Error! Reference source not found.**

Table 9: Diesel Fuel Calculations (Site Wide)

	Fuel Storage (kL)	Fuel Storage (t)
Building 1	328	290.3
Building 1A	9.5	8.41
Project Echidna	386.6	342.2
Total	724.1	640.9

Generator testing schedule indicated in Figure 10 is as advised by the Proponent from similar facilities. The schedule is proposed to be applied to each individual generator.

Table 10: Generator Testing Procedure (Project Echidna and Building 1A)

Test	Duration	Frequency
Engine - Diesel Run Test (No Load)	2-5 minutes	Fortnightly
Engine - Load Bank	30 minutes	Quarterly

Test	Duration	Frequency
Engine - Load Bank	60-120 minutes	Annual

Table 11: Generator Testing Procedure (Building 1)

Test	Duration	Frequency
Engine - Diesel Run Test (No Load)	2-5 minutes	Fortnightly
Engine - Load Bank	60 minutes	Annual

Fortnightly testing will include up to three generators at one time. Quarterly and Annual testing will be restricted to one generator at a time. Due to the number of generators on the campus, it is expected there will be some level of generator testing occurring on a weekly or fortnightly basis.

The EPA has advised that based on the text and statutory context of clause 17 of the POEO Act, that 'plant' is interpreted to encompass all generators on the premises collectively, and that 'operate' would also include testing should the internal combustible engines be turned on during testing. Applying the above testing schedule, and considering the entire site (Building 1, Building 1A and Project Echidna), the total testing time would be 162 hours per year, below the 200 hour EPA limit for standby generating plant.

The Proponent has advised a preference to undertake generator tests during both day and night to provide flexibility for their operations team. This infrastructure report and broader SSDA application is based on day time running only, however the possibility of night-time testing will continue to be assessed based on further development of the acoustic modelling as the design progresses. Any night time running will subject to compliance with more onerous night-time criteria.

Table 12: Fuel required for Project Echidna Generator Testing

	Data Hall Generator	Admin Building Generator	
Generator Fuel Consumption – No Load	142	26	L/hr
Generator Fuel Consumption – Full Load	756	208	L/hr
Annual Fuel Consumption for Generator Test	59.97	0.88	kL
Total Annual Fuel Consumption for Generator Test	60.86		kL

5.1.6 Design Status at Submission

It is understood at the time of submission that the Proponent has accepted an Offer of Connection at 132kV from Endeavour Energy, therefore enabling the substation to progress into detailed design.

5.2 Potable and Industrial Water

The buildings within the site will be supplied with both potable and industrial water supplies. Where harvested rainwater supply is not available, potable water will be supplied to the industrial water tanks, administration and bathroom areas as well as hose taps surrounding the site. Industrial water will supply the evaporative cooling system serving the data halls. In addition, the potable water supply backs up the industrial water tank fed supplies.

All tanks and pipework within the subject site will be owned and operated by the Proponent.

5.2.1 Potable Water

Potable water will be supplied from the Eastern Creek Drive water connections to the west of the site .

Potable water will supply all sanitary fixtures and fittings within the administration building. In addition, potable water will also be used as a secondary water supply source to the industrial water system when the rainwater storage tanks are offline.

5.2.2 Industrial Water

The industrial water system will supply the evaporative cooling system. The cooling system recirculates water at 4 cycles prior to discharge. The industrial water system will be supplied primarily from industrial water tanks located in a tank yard to the west of the site.

The industrial water system will be supplied from the following sources;

- Potable water from the authority's water mains.
- Rainwater harvested from building roofs

The industrial water system will draw its water source in sequence as follows;

- Rainwater tanks
- Potable water

The industrial water supply will be filtered with automatic back wash filters and automatically chemically dosed to prevent legionella growth prior to being supplied to the evaporative cooling units.

5.2.3 Fire Water Supply

The site fire water supply will be provided from the authorities water main on the estate road the north of the site. The site will also have fire water storage tanks as a secondary backup supply for the sprinkler system The site fire water storage is 260kL.

5.2.4 Demand Estimate and Water Balance

It is intended to harvest 50% of the roof water of the Project Echidna building for use in the evaporative cooling process, water closet flushing and landscape irrigation. The roof water will be captured by stormwater downpipes which shall transport the harvested rainwater to the tank yard located at the south-west corner of the site. The rainwater from the roof will be captured by an above ground 50,000 litre rainwater storage tank (if feasible and beneficial, the size of the rainwater tank will be increased during detailed design. From detailed design it was estimated that the size could increase to 163kL and hence has been used below as the purposed of this assessment).

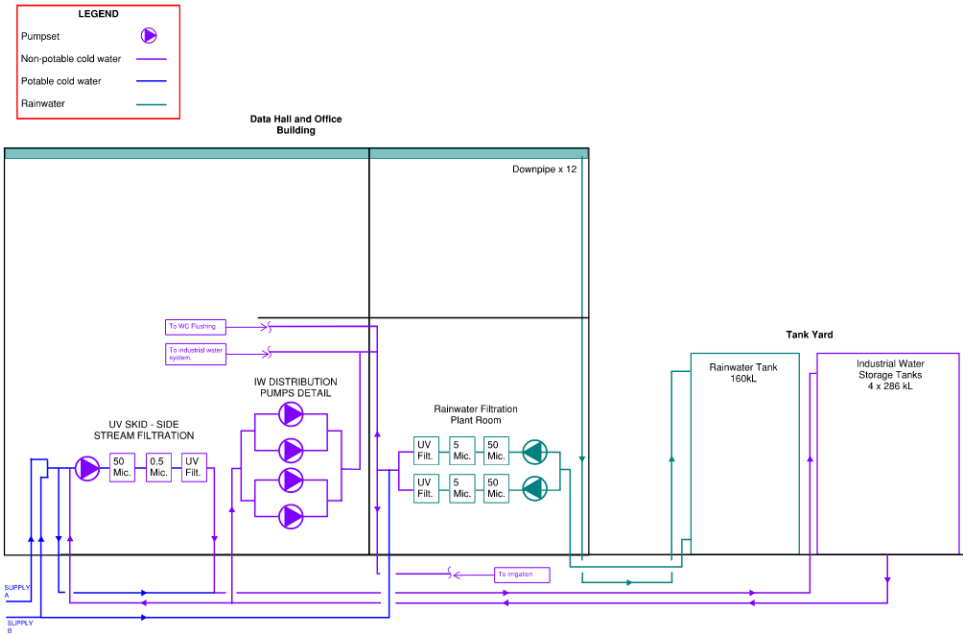

Figure 10 Water Balance Schematic

Water supplied to the evaporative cooler will be retained within the coolers' sump. Water within the sump will be pumped up to cooling pad and be partially evaporated to cool the supply air stream. To minimise water usage, the non-evaporated water will be recirculated from the sump to the pad to be evaporated. This recirculation process will occur until adequate evaporation process has taken place such that the concentration of solids within the sump water reaches four times the incoming water – achieving 4 cycle of concentrations.

In order to further reduce water consumption, the evaporative cooling system will only be switched on when ambient temperature is higher than 28.4°C. The cooling system will supply ambient air directly, without providing any form of cooling and hence not using water, when ambient temperature is less than 28.4°C.

In the final configuration, when all data halls are operational, peak water demand days in hot periods of the year the data centre are estimated to be 1,022.0m^3/day.

This demand will be reduced by utilising the rainwater stored in the site's 163,000 litre rainwater tank. The rainwater tank has been sized based on Bureau of Meteorology rainfall data from the past 10 years, estimated daily consumptions from non-potable sources (industrial water system, water closet flushing and irrigation) , and a roof catchment area of 4,385m^2. . From this the amount of rainwater that can be reused is estimated to be 2.87 mega litres/year. This is subject to change on site as this has been derived from limitations and assumptions that have been imposed.

Based on the estimated annual average potable water consumption by the cooling systems of 18.9 mega litres/year the rainwater harvesting system could reduce the potable water consumption by 15% in the ultimate configuration and by higher percentages in early stages of the ramping profile.

It is intended to supply the site construction water requirements from the either the existing Mamre Road authority's water main or from water tankers. Water for earthworks and dust suppression will be supplied from water tankers or from water within the sediment basin following filtering.

5.2.5 Consultation

5.2.5.1 Sydney Water

A Section 73 application is being submitted to Sydney Water in September 2022 providing anticipated maximum water and sewer demands, based on the peak operating day for the fully developed data centre.

The Proponent is in-process of appointing a Water Services Co-ordinator (WSC) and will continue to liaise with Sydney Water during the design process.

5.2.6 On-site Water Reticulation

Potable Water Main

The incoming potable water main will enter the site at the north-western boundary and supply existing Building 1 and will be directed to the tank yard at the south west of the site.

Fire Water Mains

The incoming fire mains enter the site at the north-western boundary and are routed towards the fire pump room adjacent to the main site entrance.

A fire reticulation network is proposed around the data halls, located under the site roads/footpath, which will supply the proposed fire sprinkler and hydrant systems.

5.3 Sanitary Drainage

The site will be serviced by sanitary drainage system that will gravity drain to a provisional sewer connection provided by Building 1. The sanitary drainage will be separated into soil waste and waste water drainage systems within the data halls.

5.3.1 Soil waste

The soil waste drainage will collect all sanitary fixtures within the administration buildings and the data halls. This drainage system will run separately to the waste water system throughout the data halls and will merge prior connecting to the sewer connection provided from Building 1.

5.3.2 Waste water

The waste water system will collect all the evaporated cooling system waste water as well as all floor waste and tundishes within the data halls. The waste water drainage systems shall run separately to the soil waste systems throughout the data halls and will merge to the site's sanitary drainage system prior to site discharge .

5.3.3 Demand Estimate

The majority of the site's discharge is from the waste water generated by the evaporated cooling system waste water. The soil waste discharge will be minimal due to relatively low staff number in relation to the size of the facility.

The ultimate waste water discharge forecast are detailed below in Table 13;

Table 13: Ultimate Water Waste Discharge Forecast

Month	No. of Days	Total Monthly (kL)			Average Daily (kL)	Peak Day Sewer Flows	
		Cooling	Sanitary	Total	Sewer Flow	Peak Day Demand (kL)	Peak Flow Rate (L/s)
January	31	1,499.72	46.50	1,546.22	67.76	263.57	27.48
February	28	885.52	42.00	927.52	42.47		
March	31	515.35	46.50	561.85	19.38		
April	30	501.03	45.00	546.03	18.64		
May	31	497.06	46.50	543.56	17.96		
June	30	487.46	45.00	532.46	18.19		
July	31	497.06	46.50	543.56	17.96		
August	31	497.06	46.50	543.56	17.96		

Month	No. of Days	Total Monthly (kL)			Average Daily (kL)	Peak Day Sewer Flows	
		Cooling	Sanitary	Total	Sewer Flow	Peak Day Demand (kL)	Peak Flow Rate (L/s)
September	30	509.49	45.00	554.49	19.84		
October	31	487.59	46.50	534.09	18.79		
November	30	1,237.21	45.00	1,282.21	57.00		
December	31	966.98	46.50	1,013.48	41.98		
Annual Total		8,581.53	547.50	9,129.03			

As detailed in the calculations above the forecast at the ultimate load when the site is fully developed at the hottest times of year in January will average 67.76 kL/day with a peak discharge flow rate of 27.48l/sec. In the cooler winter months this will reduce down to around 17.96 kl/day as water will not be required in the evaporative cooling process.

Sewer demands are significantly lower than peak water demands as industrial water is recirculated four times prior to discharge from the cooling equipment to the waste water system. In earlier year of operation, the sewer demands will be significantly lower than those presented in Table 13.

5.3.4 Connection Strategy

The proposed connection strategy is to drain sanitary drainage by gravity to the provisional sewer connection constructed as part of Building 1at the north west of the site.

5.3.5 On-Site Reticulation

The soil waste drainage and waste drainage systems for Project Echidna will reticulate under the building and in the site roads and merge prior to discharge to the 225mm sewer connection stub located at the west of the site.

5.4 Telecommunications

5.4.1 Connection Strategy

The existing campus has an extensive private in-ground telecoms network throughout the site. Four (4) existing entry points connect the campus to the broader utility telco network on Eastern Creek Drive and Old Walgrove Road. Each intake path is separated by a minimum of 50m to ensure diversity of connection.

A high-level overview of the existing private site telco network is detailed below. Project Echidna will not require any additional utility telecommunications connections to the site.

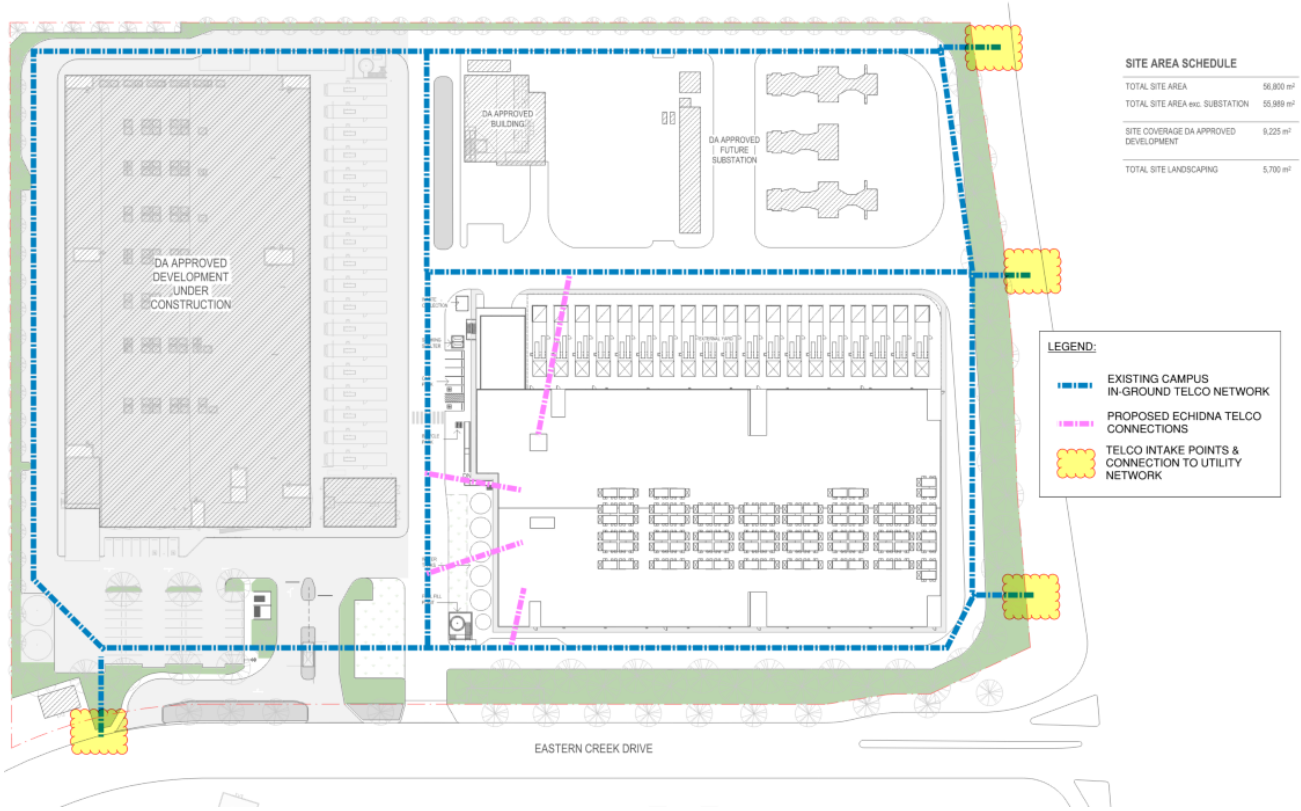

Figure 11 Proposed Telecom Connection Strategy

5.4.2 On-Site Reticulation

Within the main site, a series of 12x150mm conduits will reticulate under site roads and footpaths to support telecommunications lead-in cabling and distribution pathways.

Project Echidna will connect to the existing site network through new connections to existing campus telco pits. 4No. diverse routes will be provided into the new building (detailed in Figure 11**Error! Reference source not found.**).

5.5 Gas

No gas supply is proposed to serve the data centre facility. All power supplies will be from electrical sources with auxiliary supply from diesel generators. As such no consultation with Jemena has been undertaken.

There are no existing gas services within the proposal boundary and therefore the development causes no impact to existing gas networks.

6. Assessment of Potential Construction Impacts

This chapter presents potential construction impacts on existing utility infrastructure within the subject site.

As discussed in Section 5, construction works will be undertaken in stages over a period of time.

6.1 Electricity

During construction of Project Echidna, measures will be implemented to avoid damage to electrical services and infrastructure constructed during Building 1, 1A and Substation scopes of work.

6.2 Water Supply

In the baseline condition there is no water infrastructure within the subject site. Therefore, construction works within the subject site will cause no impacts to water infrastructure.

During later construction stages, measures will be implemented to avoid damage to water services constructed during initial stages of work.

6.3 Sewerage

In the baseline condition there is no sewer infrastructure within the subject site. Therefore, construction works within the subject site will cause no impacts to sewer infrastructure.

During later construction stages, measures will be implemented to avoid damage to sewer services constructed during initial stages of work.

6.4 Telecommunications

During construction of Project Echidna, measures will be implemented to avoid damage to Telecommunications services constructed during Building 1, 1A and Substation scopes of work.

6.5 Gas

No gas supply is proposed to serve the data centre facility. All power supplies will be from electrical sources with auxiliary supply from diesel generators. There are also no existing gas services within the subject site boundary and therefore the development causes no impact to existing gas networks.

7. Assessment of Potential Operational Impacts

Section 7 presents potential operational impacts that the development could have on the surrounding environment and public utility networks.

7.1 Electricity

Potential operational impacts of the electrical infrastructure within the subject site include:

- High electrical demand impacting the surrounding HV distribution network.
- High noise levels when testing or operating back-up generators.
- Fuel spills when filling generators and bulk tank.
- Fire and explosion risks associated with the generators and bulk tank.
- Fire and explosion risks associated with the substation.
- Air pollution when generators are operational.

7.2 Water and Sewerage

Potential operational impacts of the water and sewer infrastructure include:

- High demands reducing the capacity of the estate or precinct water and sewer networks.
- Overtopping of rainwater harvesting/water storage tanks.

7.3 Telecommunications

The key operational issue for the Proponent is that the facility can operate in the event one telecoms route is offline. The facility will be serviced by separate telecom supply routes to ensure path diversity,

8. Environmental Management Measures

Table 14**Error! Reference source not found.** details the proposed management and mitigation measures proposed as part of the design for utility impacts.

Table 14: Environmental Management Measures for Utility Impacts

ID	Impacts	Mitigation	Responsibility	Timing
IR1	High electrical demand impacting the surrounding HV distribution network.	Proposals are to have data centre specific electrical supply. Electrical authorities have confirmed that capacity exists within the network to serve the site.	Proponent/Electrical Authority	Design
IR2	High noise levels when testing or operating back-up generators.	Generators are containerised units which include noise attenuation features. The noise level of generator testing will be assessed against NSW Noise Policy for Industry.	Proponent/Contractor	Design and Operation
IR3	Fuel spills when filling generators and bulk tank	All fuel tanks will be designed to comply with AS1940. Generator fuel tanks will be double walled. A single fuel fill point with associated 40kL single skin bulk tank and bunding will be used to fill each generator. Each fill point will have all ancillaries to meet requirements of AS1940.	Proponent/Contractor	Design and Operation
IR4	Fire and explosion risks associated with the generators and bulk tank	Generators and bulk tank will be designed in accordance with AS 1940 which defines minimum clearance from building and separation between fuel storage tanks. Generators located behind security fencing/gates meaning only approved personnel can access this area.	Proponent/Contractor	Design and Operation
IR5	Fire and explosion risks associated with the substation.	HV substation will be designed by a certified Level 3 ASP designer in accordance with relevant current version of Australian Standards and Industry Associations Standards and Guidelines. Substation located behind security fencing/gates meaning only approved personnel can access this area.	Proponent/Contractor	Design and Operation

ID	Impacts	Mitigation	Responsibility	Timing
IR6	Air pollution when generators are operational	Two separate mains supply routes are proposed. Failure rates for a supply in this arrangement are extremely low meaning the generators will rarely be used. Generators will include specific emissions control measures and will be Tier 2 certified to Australian EPA requirements.	Proponent	Design and Operation
IR7	High demands reducing the capacity of the estate or precinct water and sewer networks.	To minimise the peak water demand on Sydney Water's potable water network, the water balance of the proposed site has been maintained through the use of rainwater re-use tanks and the provision of fire and water storage tanks on site. Consultation with Sydney Water through the design process has confirmed that the precinct wide water and sewer networks will be designed to cater for peak day flows from the final configuration of the data centre.	Proponent / Sydney Water	Design / Construction
IR8	Overtopping of rainwater harvesting/water storage tanks.	Water overtopping from the rainwater tanks will discharge to the stormwater system. Discharged water will not contaminate the surrounding environment as it will be from either mains supply or roof collected which has passed through water quality treatment features.	Proponent	Design / Operation
IR10	Redundant telecoms supply	Project Echidna is provided with 4No. diverse Telco connections to the existing campus Telco communications network. 4No. telecommunications intake points are provided to the campus. Each intake point is separated by a minimum of 50m to minimise risk of concurrent damage to multiple pieces of telecommunications infrastructure.	Proponent	Design / Operation

9. Summary of Residual Impacts

This section provides a summary of the construction and operational risks both pre-mitigation and any residual impacts remaining after the implementation of the management measures describe in Section 7. Pre-mitigation and residual impacts are summarised in Table 15.

Table 15: Summary of pre-mitigation and residual impacts

Potential pre-mitigation adverse impact	Relevant management measures	Potential residual impact after implementation of management measures	Comment on how any residual impacts would be managed
Construction			
Operation			
High noise levels when testing or operating back-up generators.	Generators are containerised units which include noise attenuation features. Generators will only operate in the unlikely event that both electrical supplies are off-line.	Potential that noise levels are high.	The noise level of generator testing will be assessed against NSW Noise Policy for Industry. Testing of generators to be undertaken during daytime periods (and potentially night-time periods subject to further acoustic modelling, noting more onerous requirements)
Fuel spills when filling generators and bulk tank.	Generator belly tanks will be double walled. Fuel offtake bulk tank will be bunded. Each fill point will have all ancillaries to meet requirements of AS1940.	Risk of accidental spills when fuelling.	Operator to prepare a management plan detailing safe method of work for filling generators. Supplier to have spill kits available at the time of filling.
Fire and explosion risks associated with the generators and bulk tank.	Generators positioned suitably clear from buildings. Suitable separation provided between fuel storage tanks ("belly tanks") and generators. Access to generators limited to approved personnel.	Low risk of fire and explosion.	Operator to implement monitoring and maintenance plan. Generator area to be kept clean and free from flammable materials. Generators to be frequently inspected for faults/defects.
Fire and explosion risks associated with the substation.	HV substation will be designed by a certified Level 3 ASP designer in accordance with relevant current version of Australian	Low risk of fire and explosion.	Operator to implement monitoring and maintenance plan. Substation to be kept clean and free from flammable materials. Substation to be frequently inspected for faults/defects.

Potential pre-mitigation adverse impact	Relevant management measures	Potential residual impact after implementation of management measures	Comment on how any residual impacts would be managed
	Standards and Industry Associations Standards and Guidelines Access to substation limited to approved personnel.		

10. References

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